

Appl. No. 09/961,092  
Amdt. Dated October 20, 2004  
Reply to Office action of September 28, 2004

**Amendments to the Claims:**

The listing of the claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. – 12. (Cancelled).

13. (Currently amended): A back pressure valve, comprising:

(a) a first housing including a first chamber formed therein having a fluid inlet and a fluid outlet for a first fluid, the fluid outlet being an outlet of the back pressure valve;

(b) a second housing including a second chamber formed therein;

(c) a flexible diaphragm having an outer peripheral edge portion abutting the second housing and closing off the second chamber;

(d) a back pressure member moveably disposed in the first chamber of the first housing for controlling fluid flow between the fluid inlet and the fluid outlet, wherein the first chamber is defined by the first housing and the back pressure member; and wherein the flexible diaphragm is fixed onto and moveable together with the back pressure member, whereby pressure in the second chamber determines fluid pressure required to maintain the back pressure member in a steady position;

(e) a reference inlet and a reference outlet, for a reference fluid, provide in the second housing, and a control valve means in the second housing connected to the reference inlet and the reference outlet, for controlling the

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pressure in at least part of the second housing applied to the flexible diaphragm and the back pressure member;

wherein the back pressure member is moveable to a closed position in which the back pressure member seals off fluid flow between the fluid inlet and the fluid outlet;

wherein the first chamber includes a bore, wherein the fluid inlet and the fluid outlet open into the bore, and wherein the back pressure member is slidably mounted in the bore for movement within the bore;

wherein the back pressure valve further comprises a sleeve member disposed within the first housing and providing said bore for the back pressure member, the sleeve member being fixed to the first housing and having a lower opening that is closed by the back pressure member in the closed position and that permits fluid to flow from the fluid inlet to the fluid outlet when the back pressure member is in an open position;

wherein the back pressure member comprises a valve plug disposed substantially within the sleeve member; and

wherein the back pressure member further comprises an annular seat member disposed at a lower end thereof, whereby, when the back pressure member is in the closed position, the annular seat member abuts a circular shoulder of the sleeve member to thereby close said lower opening.

14. (Previously presented) A back pressure valve as claimed in claim 13, that includes at least one pressure controlling device connected to the control valve means.

15. (Previously presented) A back pressure valve as claimed in claim 14, that includes a processor connected to the pressure controlling device.

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16. (Previously presented) A back pressure valve as claimed in 15, that includes a pressure transducer, for measuring pressure downstream of the outlet for the first fluid, and connected to the processor, to provide feedback on the downstream pressure.

17. (Previously Presented) A back pressure valve as claimed in claim 13, wherein the control valve means comprises a reference inlet valve for controlling flow of the reference fluid into the second chamber and connected to the reference inlet, and a reference outlet valve connected to the reference outlet for controlling flow of the reference fluid out from the second chamber.

18. (Previously Presented) A back pressure valve as claimed in claim 17, wherein the reference inlet and outlet valves are mounted on a member separate from and mounted on the second housing.

19. (Previously Presented) A back pressure valve as claimed in claim 18, wherein said member comprises a gas dome, and wherein the second housing includes an end wall on which the gas dome is mounted.

20. (Previously presented) A back pressure valve as claimed in claim 19, wherein the end wall separates another chamber from the second chamber, with the first and second valves being located in the other chamber.

21. (Previously Presented) A back pressure valve as claimed in claim 20, wherein the second housing includes a through hole in the end wall, and wherein the gas dome is mounted on the end wall closing off the through hole.

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22. (Previously Presented) A back pressure valve as claimed in claim 21, wherein the gas dome includes a flange portion abutting the end wall, the end wall and the flange portion each include at least one hole permitting reference gas to flow from the reference gas inlet to the reference inlet valve, the flange portion includes at least one hole permitting the reference gas to flow from the reference inlet valve to the interior of the gas dome and at least one hole permitting the reference gas to flow out from the interior of the gas dome to the reference outlet valve, and the end wall and the flange portion each include at least one hole permitting the reference gas to flow from the reference gas outlet valve to the reference gas outlet.

23. (Previously Presented) A back pressure valve as claimed in claim 22, wherein the gas dome includes a hollow cylindrical portion, with the flange portion provided around the hollow cylindrical portion.

24. – 26. (Cancelled)

27. (Previously Presented) A back pressure valve as claimed in claim 13, further comprising a holding means attached to the flexible diaphragm and holding the back pressure member to the diaphragm, whereby the back pressure member and the diaphragm are moveable together.

28. (Previously Presented) A back pressure valve as claimed in claim 13, further comprising a third chamber defined by the first housing, the sleeve member and the flexible diaphragm, the third chamber being in fluid communication with the first chamber.

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29. (Previously Presented) A back pressure valve as claimed in claim 28, wherein the fluid communication between the first chamber and the third chamber is provided by a bore within the first housing.

30. (Previously Presented) A back pressure valve as claimed in claim 28, wherein a first connector is provided in fluid communication with the first chamber, a second connector is provided in fluid communication with the third chamber and the fluid communication between the first chamber and the third chamber is provided via said first and second connectors.

31. – 32. (Cancelled)

33. (Currently amended) A back pressure valve as claimed in claim ~~32~~, 13, wherein the valve plug has an annular recess at a lower end thereof for receiving the annular seat member.

34. (Currently amended) A back pressure valve as claimed in claim ~~34~~, 13, wherein the sleeve member has at least one side opening and the valve plug has an annular flow channel which, when the back pressure member is in the open position, cooperates with the at least one side opening to provide fluid communication between the lower opening and the fluid outlet.